

GENERAL NOTES AND SPECIFICATIONS

GENERAL

1. All structural drawings to be read in conjunction with the relevant architectural, mechanical & electrical engineers drawings and the specifications in the Bill of Quantities. Any errors, omissions & discrepancies to be brought to the attention of the engineer immediately.
2. Where conflicting specifications between the drawings & bill of quantities occur, the drawings and these specifications will take preference over the specifications in the bill of quantities.
3. The contractor shall ensure that waterproofing materials are not damaged during backfilling operations and fixing of steel. Replacing of material due to damage for contractor's cost.
4. It remains the Main Contractors Responsibility to compare drawings and notify the Relevant parties of any discrepancies within a reasonable time frame
5. Products different to those specified may only be used if approved by the Engineer. Approval is to be requested in writing.
6. No scaling of Drawings allowed
7. All SANS specifications mentioned in the notes, on the drawings and in the project specifications shall be available on site at all times.
8. All work shall be executed in strict accordance with SABS 1200 and the project specifications in the contract documentation.

FOUNDATIONS AND EARTHWORKS

1. All excavations must be inspected and approved by the engineer before placing of any concrete foundation, blinding, and waterproofing or geofabric membrane.
2. A 50mm thick blinding layer of 10 MPa/19mm shall be cast under all reinforced foundations. No blinding layer is required to be cast under brickwork or mass concrete foundations.
3. All foundations shall be placed symmetrically below columns and brickwork unless otherwise shown.
4. Unless otherwise specified, all backfilling beneath surface beds or behind retaining walls shall be compacted to 98% MOD AASHTO in layers not exceeding 150mm Thick.
5. No foundation or ground beams shall be cast on non-engineered fill or backfill material. Portions that are over-excavated beyond the depth required by the Geotechnical / Resident Engineer, to be filled with mass concrete (10MPa/ 19mm) at the Contractor's expense.
6. Levels of bases as shown are preliminary and have to be confirmed by the geotechnical engineer on site to obtain the specified bearing pressure. Where excavation levels have to be lowered, the engineer will issue a site instruction with the correct procedure to be implemented.
7. Founding levels on site are to be forwarded to the engineer in good time for reinforcing details

BRICKWORK AND BLOCKWORK

1. The minimum crushing strength of all loads bearing brickwork shall be 14 MPa.
2. The minimum crushing strength of all load bearing blockwork shall be
- (a) 14 MPa for 90 mm block
- (b) 10 MPa for 140 mm block
3. The minimum crushing strength of mortar shall be as for Class II mortar in accordance with Table 1 SABS 0164 Part I - 1980.
4. Reinforcement:
- (a) Load bearing brickwork shall be reinforced with an approved brickforce every fourth course unless otherwise specified on drawings.
- (b) Load bearing blockwork shall be reinforced with an approved brickforce every second course unless otherwise specified on drawings.
- (c) In addition, brickforce is required in every course for the first four courses on top of the foundations & slabs as well as over door and window openings (min. Laps = 300mm)
5. All brickwork / blockwork shown on engineer's drawings is load bearing unless otherwise indicated.
6. See architect's drawings for general layout of brickwork / blockwork. Setting out of all brickwork to be done from architect's drawings.
7. All brick anchors and straps shall be **HOT-DIP GALVANIZED**. All wall ties to be Possi ties.
8. 10mm V-joints are to be made in plasterwork where brickwork / blockwork and concrete join.
9. Additional ties shall be provided at openings, discontinuities (e.g. control joints) spaced at intervals not exceeding 300mm Vertically or where deemed necessary or as shown on the drawings such as at external angles
10. Non-load bearing brickwork / blockwork may not be built closer than 20mm from the soffits and sides of beams and slabs unless otherwise shown. Where required (for visible joints) the joints shall be filled with 50mm soft board or similar approved, and sealed on both sides with Elastomeric Sealant Shore A Hardness 25. Note that this is not per se a waterproofing detail (this specification is for a flexible movement joint). Any specific waterproofing requirements to architects details.
11. Refer to architect's drawings for positions of expansion joints in brickwork / blockwork.
12. Wall ties for cavity walls to comply with requirements of SABS 0400 subject to the provision that ties of the single wire type shall not be used.
13. All brickwork, blockwork, anchors, wall ties and straps shall be in accordance with SABS 0400 - 1990 and SABS 0164 - 1980 including the latest revision or to a maximum of every:
- (a) 450 mm Vertically

- (b) 600 mm Horizontally
14. In cavity walls, wall ties shall join the leaves and shall be embedded in masonry joints at right angles to the leaves as the work progresses.
15. Additional ties shall be provided at openings, discontinuities (eg. control joints) spaced at intervals not exceeding 300mm vertically, or, where deemed necessary or as shown on the drawings such as at external angles.
16. All brickwork shall be fixed to / shot fired into concrete & steel columns by means of **HOT DIPPED GALVANIZED** hoop iron every fourth course and blockwork every second course.
- N.B.**, Hoop iron must be bent sufficiently to allow lateral movement between brick/blockwork and concrete/ steel columns

CONCRETE

1. **CODES AND STANDARDS**
- 1.1. All reinforced in-situ and pre-cast concrete for structural use has been designed in accordance with the requirements of SANS 10100 Part 1 and detailed in accordance with SANS 10144.
- 1.2. All reinforced in-situ and pre-cast concrete for structural use shall be constructed in accordance with the requirements of this Project Specification, SANS 10100 Part 2 and SANS 1200 G.
2. **MATERIAL**
- 2.1. **Cement**
- 2.1.1. The source of all cementitious material shall remain constant for the full construction duration of this Project.
- 2.1.2. Cement used shall comply with the requirements of SANS 50197 Part 1.
- 2.1.3. GGBS and PFA Extenders used shall comply with the requirements of SANS 1491 Parts 1 & 2.
- 2.2. **Water**
- 2.2.1. Mix and wash water shall be clean and potable, and free from any substance that may impair the strength or durability of the concrete.
- 2.3. **Aggregates**
- 2.3.1. All aggregates sources shall remain constant for the full construction duration of this Project.
- 2.3.2. Aggregates shall comply with the requirements of SANS 1083. The maximum water absorption of the coarse aggregate shall not exceed 1% and the flakiness index shall not exceed 25. The maximum water demand of the fine aggregate shall not exceed 190 litre/m³.
- 2.3.3. The aggregates shall be tested in accordance C-15 of SANS 1083 to confirm that they are **non-reactive** to alkali-reactivity.
- 2.4. **Admixtures**
- 2.4.1. No admixture containing calcium chloride shall be permitted for use in this Project.
- 2.4.2. Admixtures shall be obtained from a single manufacturer when more than one is intended for use in a mix design.
- 2.4.3. Proposed admixtures shall be used in trial panels to prove their performance in wet and dry states to the satisfaction of the Engineer
- 2.5. **Reinforcement**
- 2.5.1. All steel bars shall comply with the requirements of SANS 920 and welded steel fabric with the requirements of SANS 1024.
- 2.5.2. Manufacturers test certificates shall be submitted to the Engineer for all classes of steel reinforcement supplied.

CONSTRUCTION

- 3.1. **Reinforcement**
- 3.1.1. All reinforcement has been detailed in accordance with SANS 10144. The minimum cover to reinforcement in this Project shall be as follows (unless noted otherwise on drawings):
- | | |
|-------------------------|-------|
| * Slabs | 35 mm |
| * Beams (to Stirrups) | 35 mm |
| * Columns (to Stirrups) | 35 mm |
| * Foundations | 50 mm |
- The permissible deviation for cover to reinforcement in the above mentioned elements shall be -0, +5mm irrespective of any degree of Accuracy classification.
- 3.1.2. No tie-wire shall encroach on the specified minimum cover by more than a strand thickness.
- 3.1.3. Concrete cover blocks shall be manufactured in accordance with the requirements of SANS 10100 Part 2 (8.4.1.2). Fixing wire shall be fully galvanised Class A in accordance with SANS 675. All cover blocks used shall be of a semi-spherical shape. Blocks shall be fully cured in water for 14 days before use.
- 3.1.4. Plastic 'Snap-On' positioners may be used provided they are of sufficient strength and quality such that they do not distort, and that they shall be securely wired at cross-rebar junctions, but only on the bottom shutter.
- 3.1.5. All rebar placed in the structure shall be thoroughly cleaned by *(washing)* with clean potable water within 24hours prior to concrete encasement.
- 3.1.6. All reasonable attempts shall be made in the storage of rebar on site to avoid contamination. Soiled/contaminated rebar shall be cleaned prior to fixing to position.
- 3.2. **Formwork**
- 3.2.1. All formwork to comply with SANS 1200G; 5.2. as follows:-
- 3.2.1.1. Ground beams and Foundations- Degree Accuracy III- "rough"
- 3.2.1.2. All other exposed (visible surfaces) e.g. columns, beam, top of raft slab and suspended slabs - Degree Accuracy I- "smooth"
- 3.2.2. Minimum stripping times for the various types of structural member shall be as stated in SANS 10100 Part 2 and SANS 1200 G unless agreed otherwise with the Engineer.

- 3.2.3. All visible corners shall have a minimum 15 x 15mm chamfer unless shown otherwise.
- 3.3. **Concrete**
- 3.3.1. Limit on Water / Cementitious materials Ratio:
- * Maximum permissible W/C 0,45
- 3.3.2. Strength Requirements:
- The minimum compressive strengths required for structural purposes are shown on the relevant drawings and documentation. The various minimum strength requirements @ 28 days are (unless noted otherwise on drawings):
- * Columns, Slabs and Beams: 35 MPa/ 19mm
- * Foundations: 35 MPa/ 19mm
- * Blinding: 15 MPa /19mm
- 3.3.3. Mix Design:
- All concrete shall be manufactured on mix designs approved by the Engineer. All concrete shall contain 50% GGBS Chryso Fuge B (or similar) pore blocking water proofing admixture.
- Mixes submitted to the Engineer for approval shall verify their potential to meet or better the Strength requirements listed in clause 3.2.2 above.
- Mix designs must be submitted to the engineer a minimum of 2 weeks in advance of any intended concrete pour.
- 3.3.4. Consistence:
- In general concrete shall have a slump of 75mm +25mm.Pumped concrete shall have a slump of 100mm +30mm. Any concrete with a measured slump greater than 130mm shall not be placed in the structure.
- 3.3.5. Bleeding: All concrete shall be so proportioned and the materials so selected that bleeding is kept below 0.3mm/cm² as measured by the ASTM C232 - 99 test.
- 3.3.6. Shrinkage: All concrete shall be so proportioned and the materials so selected that shrinkage as measured by SANS 1085 test is kept below 0.06% when batched at the maximum slump allowed.
- 3.3.7. Temperature of Concrete: The temperature of the concrete shall be measured at point of delivery and shall fall within the range of 10°C and 32°C. Concrete which has a temperature outside of this range shall not be placed in the structure.
- 3.3.8. Compliance Testing: Cubes shall be tested at 7 and 28days for 'Strength' (clause 3.2.2 above). Any further tests for early stripping of shutters or stressing will be at the Contractors Costs.
- Results shall be reported with statistical analysis to demonstrate their compliance with the acceptance criteria stated in SANS 1200 G (para. 7.3)
- As instructed by the Engineer samples shall be randomly tested at an approved laboratory for correlation purposes.
- 3.4. **Construction Joints**
- 3.4.1. All horizontal and vertical construction joints shall be cleaned of all dirt and loose particles. All intersections of construction joints with concrete surfaces, which will be exposed to view, shall be made straight and level or plumb.
- The preferred method of preparing a construction joint is as follows:-
- The surface of the concrete to be prepared shall be between 6h and 12h old after completion of placing and shall be 'blown off' using a high pressure water jet until all dirt and laitance is removed, and particles of clean coarse aggregate are exposed sufficiently to produce a rough keyed surface. (The success of this method of preparation is dependent on selection of the correct time and equipment to suit the cement type and atmospheric conditions).
- Alternatively the substrate face shall be lightly scabbled using an electric/pneumatic bush hammer/meat cleaver.
- The prepared surfaces shall be saturated with fresh clean water for a period of 4 hours prior to the adjoining pour. Prior to placement of concrete the surface condition shall be 'saturated - surface dry' i.e. no ponding or standing of water. I any adjoining surface is found to be dry the pour will be delayed until the surface is saturated sufficiently to the satisfaction of the engineer.
- 3.5. **Curing**
- 3.5.1. Restriction: 'High Temperature Accelerated Curing' shall not be permitted.
- 3.5.2. Exposed visible slabs to be water cured as per method below:
- Within a maximum of 2hrs after the formwork has been removed the concrete element shall be wet cured by covering with an inner hessian membrane and an outer puncture-free plastic membrane. The hessian membrane shall be kept continuously damp by an independent automatic sprinkler system. The hessian and plastic membranes are to be firmly secured and kept flush to the concrete surface for a minimum period of 10days. Concrete columns and walls must be fully shrink wrap the walls in plastic and seal closed at the ends.
- 3.5.3. Other surfaces can be cured using Chemical compounds which are subject to approval by the engineer. N.8 any surfaces subject to additional finishes (e.g. screed/micro concrete or levelling compound), the cost for removal of the curing compound shall be borne by the contractor.
- 3.5.4. The Contractor must ensure that all materials required for the curing process are on hand before stripping any formwork, and that these measures are implemented immediately after the formwork has been removed.
- 3.5.5. Surfaces that have not been formed against formwork (e.g. top surface of columns, beams, slabs etc) shall be protected as soon as it is possible to do so without causing damage to that surface
- 3.6. **Tolerances**
- 3.6.1. The permissible deviation for all visible external facade concrete surfaces shall be Degree of Accuracy II (1200 G).
- 3.6.2. The permissible deviation for unseen in-situ works (e.g. columns, beams, slabs and raft slab) shall be Degree of Accuracy II (1200 G).
- 3.6.3. The permissible deviation for unseen In-situ works (e.g. foundations and ground beams) shall be Degree of Accuracy III (1200 G).
- 3.6.4. The permissible deviation for Cover to Reinforcement in all exposed concrete

- work shall be -0 +5mm irrespective of the Degree of Accuracy.
- 3.7. **Concrete Surfaces**
- 3.7.1. When a wood-floated finish is specified, the surface shall first be treated as follows. Immediately after placing and compaction, the concrete shall be screeded with true straight edged equipment working between forms or other guides set accurately to line and level. No mortar shall be added to depressions and proud aggregate shall be tamped level. After the concrete has hardened sufficiently it shall be floated to a uniform surface free from trowel marks with a wooden float. Within 2hrs of final set curing of the concrete shall commence.
- 3.7.2. When a steel-floated finish is specified, the surface shall be treated as specified for a wood-floated finish above, except that when the bleed water has disappeared and the concrete has hardened sufficiently to prevent the migration of laitance foam to the surface, the levelled surface shall be floated with a steel trowel on which firm uniform pressure shall be applied to provide a dense, smooth, uniform surface free from any irregularities.
- 3.7.3. When a power-floated finish is specified, the surface shall be treated as specified for a wood-floated finish above, except that the levelled concrete surface shall be power-floated to provide a dense surface. After the bleed water has disappeared and the concrete has hardened sufficiently the float-blades shall be replaced with trowel-blades and the surface power-trowelled with a single pass to provide a dense, smooth, uniform surface free from irregularities.
- 3.7.4. When a power-trowelled finish is specified, the surface shall be treated as specified for power-floated finish above, except that after fitting the trowel-blades the surface shall be continually burnished to provide a dense, smooth, high quality polished surface free from all irregularities.
- STRUCTURAL STEELWORK**
1. The fabrication and erection tolerances of all structural steelwork to be in accordance with SANS 2001-CS1. Rolling tolerances of structural hollow sections to comply in accordance with SANS 657- Part 1
2. Welding shall conform to SANS 10167 - 1984 and 10044 specifications and AWS D 1.1 specifications.
3. All welds to be 6mm continuous fillet weld unless otherwise specified.
4. All welds to be ground smooth.
5. All welds to be done with E7018 electrodes unless otherwise specified.
6. Butt welds shall develop the full strength of the elements joined.
7. Only coded welders shall perform all welding.
8. All site welding shall be done by suitably qualified and experienced welders using proper equipment in good condition.
9. The contractor shall design all welds and, where necessary, gussets of sufficient strength shall be provided to obtain the required weld length to ensure the full strength of the connection.
10. Tolerances on drawings to be strictly adhered to.
11. Setting-out points at member centroids shall conform to those shown on general arrangement drawings. No eccentricities, except those shown on the engineer's drawings, shall be allowed. Fabricator to ensure that centres of gravity of members intersect at node points.
12. All dimensions shall be checked on site before shop drawings commence. Any discrepancies shall be brought to the attention of the engineer.
13. A complete set of shop drawings shall be submitted to the engineer for approval before fabrication commences. Engineer to approve design intend only.
14. The contractor shall allow 2 weeks for checking and approval by the engineer, and shall also allow for any possible changes to shop drawings.
15. All cold formed hollow sections and hot rolled structural steelwork shall be grade S355JR
16. All structural bolts shall be grade 8.8 unless otherwise noted - **HOT DIPPED-GALVANIZED**.
17. Where temporary bracing or propping is required, the contractor shall be responsible for the design, erection, maintenance and removal (where necessary) of such supports. If splices in trusses are required due to transport, proposals of this shall be submitted to the engineer at an early stage for written approval.
18. The proposed method and sequence of erection of the structure shall be submitted to the Engineer for written approval
19. Laminated finger shaped packing to be provided under base plates (hot-dip galvanized).
20. Where slotted holes for bolts occur, the nut shall be hand tightened and a lock nut be provided unless noted otherwise.
21. The contractor shall submit his QCP to the engineer for approval before commencing
22. The contractor shall submit the following to the Engineer:
- * Certificates of coded welders.
- * Weld procedure specification (WPS).
- * QCP (Quality Control Plan)
23. Where applicable, grout shall be provided under base plates before any primary loads are applied to the structure. (Prostrcut 531 Grout)
24. The contractor shall, at the commencement of the project, acquaint himself with the availability and delivery time of the products and steel profiles specified on the drawings so that such material can be ordered ahead of time.
25. Paint Specification:-
- 25.1. All steelwork to be Hot Dip Galvanized to SANS 121 (ISO 1461).
- 25.2. All steelwork to be thoroughly cleaned, lightly abraded and rinsed before painting proceeds. Wash galvanized steelwork with GALVO CLEAN, galvanized iron cleaner, whilst abrading surface with scotchbrite pads to remove all oils, grease, salts and other contaminates. Rinse thoroughly with clean potable water. Allow to dry.
- Apply 2 coats of PENGUARD SPECIAL (Zinc Phosphate pigmented Epoxy), to a DFT

- of 100 microns per coat. Allow to dry overnight, (minimum drying time to recoat, at 23 °C, is 8 hours). A Stripe Coat by brush to be applied to all leading edges, angles, internal corners, bolts, drilled holes and cut-out areas before each full coat. Apply 1 x finishing coat of HARDTOP AS to a DFT of 50 to 60 microns. Colour to architects specification.
- Paint supplier - Jotun Paints South Africa (Pty) Ltd Tel (031) 709 0161
- 25.3. All CFC Purlins and Girts to be Hot Dip Galvanized to SANS 121 (ISO 1461)
9. Laminated finger shaped packing to be provided - **HOT DIP GALVANIZED**
10. All structural steel drawings to be read in conjunction with the relevant architectural, concrete drawings as well as the Bill of Quantities and any discrepancy to be brought to the attention of the engineer.

EXISTING STRUCTURES

1. Any brickwork supporting existing roof slabs which is demolished must be approved by the Engineer before demolition.
2. Any additional fittings required should be suspended from the existing beam and block slab by HILTI M10 @ 300 c/c HIT-AN Anchors with HIT-HY50 injection mortar minimum depth of 80mm.
3. Procedure for dowelling into PT slab:-
- 3.1. Contractor to determine position of column from Structural drawing.
- 3.2. Contractor to confirm location of PT cables with Structural Engineer (top and bottom).
- 3.3. Inform architect if column position is acceptable or needs to be changed.
- 3.4. Once position is approved, contractor to mark slab as follows:
- 3.4.1. Close to support lines - top surface of slab
- 3.4.2. Midspan vicinity - soffit of slab
- 3.4.3. Any other location - BOTH top and soffit surfaces
- 3.5. Scan minimum 1,5m band in both directions with cover meter on relevant surface and mark 'steel' and 'PT cable' locations.
- 3.6. Compare marked locations with 'rebar' and 'cables' drawings (the tendon position could be identified by its irregular spacing relative to 'regular' rebar spacing).
- 3.7. If NOT CLEAR expand cover survey on either side, looking for the irregular spacing.
- 3.8. If STILL NOT CLEAR CAREFULLY expose 'steel' in immediate vicinity of ideal hole position.
- 3.9. If STILL IN DOUBT, the hole should continue to be carefully 'BLOWN CLEAN and BROKEN' using light drills/breakers.
- 3.10. On completion of the above and verification that cables have been located, proceed to core hole making sure that the area below is safe.

 CITY OF TSHWANE Gauteng Province PO BOX 1022 PRETORIA 0001 CITY OF TSHWANE WATER AND SANITATION BUSINESS UNIT	AMENDMENTS					WATER AND SANITATION FOR INTERNAL APPROVAL - RECEIVED SIGN WHEN APPLICABLE					CONSULTANT DETAIL					DESIGNED		CONTRACT No:	PROJECT STATUS RECEIVED SIGN WHEN APPLICABLE				LOCATION OF PROJECT:	
	NR	DATE	APPROVED	DESCRIPTION	PAR	DIRECTOR: W&S INFRASTRUCTURE PLANNING AND SYSTEM DEVELOPMENT					 PROJECT MANAGERS & ENGINEERS DLV 144 Mark Street Vryheid P.O. Box 1460 Vryheid 3100 Tel: 034 980 7242 Fax: 034 983 2765 Email: info@dlveng.co.za I, _____ Prof Reg No: _____ HEREBY CERTIFY THAT THE SERVICES WILL HAVE BEEN INSTALLED ACCORDING TO NOTE 9 OF THE ABOVE NOTES AND TO THE DRAWING _____ SIGNATURE _____ DATE _____ CONSULTANT DRAWING NUMBER: _____ 					NAME: _____ Prof Reg No: _____		PROJECT No.	PROJECT ENGINEER of COT: NAME: _____ Prof Reg No: _____				GENERAL NOTES AND SPECIFICATIONS	
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						REGIONAL DIRECTOR: (1,2,3,4,5,6 or 7)					NAME: _____ Prof Reg No: _____ SIGNATURE: _____ DATE: _____					CHECKED		PAPER SIZE:	INSPECTOR OF WORKS of COT: NAME: _____ Prof Reg No: _____				WBS No. : _____	
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